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Plasmonic fiber-optic sensors

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Surface plasmon resonance (SPR) optical fiber sensors can be used as a cost-effective and relatively simple-to-implement alternative to well established bulky prism configurations for *in-situ* high sensitivity biochemical and electrochemical measurements. The miniaturized size and remote operation ability offer them a multitude of opportunities for single-point sensing in hard-to-reach spaces, even possibly *in vivo*. Grating-assisted and polarization control are two key properties of fiber-optic SPR sensors to achieve unprecedented sensitivities and limits of detection. The biosensor configuration presented here utilizes a nano-scale metal-coated tilted fiber Bragg grating (TFBG) imprinted in a commercial single mode fiber core with no structural modifications. Such sensor provides an additional resonant mechanism of high-density narrow cladding mode spectral combs that overlap with the broader absorption of the surface plasmon for high accuracy interrogation. In this paper, we briefly review the principle, characterization and implementation of plasmonic TFBG sensors, followed by our recent developments of plasmonic fiber-optic vector magnetometer, the surface and localized affinity studies of the biomolecules for real life problems and the electrochemical actives of electroactive biofilms for clean energy resources.

Biography

Tuan Guo has received his PhD in Optics from Nankai University in 2007. He has joined the Jinan University as an Associate Professor in 2011 and promoted to a Full Professor in 2014. He has authored and coauthored more than 120 papers in the peer-reviewed international journals (included 4 invited review papers) and presented over 20 invited talks at international and national conferences. He holds 15 patents and pending patents. His research activities include optical fiber sensors, fiber lasers, fiber gratings, plasmonics, biophotonics. He was an Associated Editor for Journal of Sensors from 2010 to 2014 and a Guest Editor for MDPI Sensors in 2016. He is a Senior Member of the IEEE and the Optical Society of America (OSA).

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